


**Qwest Foundation for Education  
Competitive Sub-grant Proposal Assurance Sheet**

Project Title: Calculator Based Data Collection Amount of Request: \$ 8,909  
 Name of Certificated Teacher (or "lead teacher" if more than one): Sam Franklin  
 Name of School currently teaching at: Valley High School  
 District Name: Valley School District District Number: 262  
 Total number of teachers involved (if more than one): 7  
 Approximate number of students impacted: 300 Grade level(s) impacted: 7-12  
 Content area(s) impacted: Math and Science

I certify that if I receive a Qwest Foundation for Education Grant –

- I agree to create a 5-minute video highlighting my project for the purposes of sharing best practices with other Idaho K-12 teachers.
- I agree to do one presentation on my project to other Idaho K-12 teachers before October 31, 2011.
- I agree to submit an electronic report to the Idaho State Department of Education before October 31, 2011.

Superintendent Name (print) <u>Dwain R. Bobily</u>	E-mail	Telephone <u>829-5333</u>
Signature 		
Principal Name (print) <u>Rod Malone</u>	E-mail <u>malone@valley262.org</u>	Telephone <u>829-5353</u>
Signature <u>Rod Malone</u>		
Teacher or Lead Teacher Name (print) <u>SAM FRANKLIN</u>	E-mail <u>sfranklin@valley262.org</u>	Telephone <u>829-5353</u>
Signature <u>Sam Franklin</u>		
Technology Director (print)	E-mail	Telephone
Signature		

Submit one digital copy (PDF format) of your proposal by November 19, 2010 via e-mail to:

Jimmy Takata  
[jtakata@sde.idaho.gov](mailto:jtakata@sde.idaho.gov)  
 208.332.6937

\*Only one PDF file per teacher applicant will be accepted (this includes the Assurance Sheet). Faxes will not be accepted.

Qwest Foundation for Education  
Sub-Grant Proposal  
Calculator Based Data Collection

Abstract

The Valley School math and science staff is in the continual process of working to provide the best teaching practices and opportunities for students. One of our goals is to improve our use of technology in the classroom. We have started accumulating hardware and knowledge and hope that the Qwest grant will enable us to make more progress. The request that we are making will enable us to acquire a new classroom set of TI-84 graphing calculators from Texas Instruments, LabPro interfaces, pH sensors, and temperature sensors for data collection. I will provide teacher training to other math and science staff members. I can help the teachers of Valley use the combination to its utmost potential.

The LabPro interfaces are very versatile as they are able to communicate with computers or calculators and can collect data from dozens of data collection sensors. The data then can quickly be graphed and analyzed. Our science labs do not currently have technology that will collect and store data in such an efficient manner. Students currently collect most data manually. Manual data collection is important and has benefits for learning. Collecting data manually can also be time consuming and has more likelihood for inconsistency. The real time data collection that the LabPro can provide allows us to instantly observe mathematical and scientific relationships connected to physical actions and chemical changes. This method of collection is less cumbersome and allows for students to focus on concepts more quickly than collecting and plotting data manually.

These classroom tools will have immediate and ongoing effect on our students and those of the other teachers who will be reached through continued instruction at the school level and beyond. Students will be able to see and experience mathematics and science in ways that are not possible without such technology. The National Council of Teachers of Mathematics Standards and the Idaho Standards support use of such technology if it will effectively help students make connections, reason, communicate, and translate between different mathematical representations. The effective use of the technology will help students in these areas. Currently, we experience positive results and hope to bring these learning opportunities to more students at Valley School.

Valley School is a K-12 rural school located literally in the middle of farming country. We serve the communities of Hazelton and Eden. We have 327 students in grades 6-12. These students will receive the benefits of this technology. At this time, 68% of these students receive free and reduced lunch, 38% are Hispanic and 18% are ELL.

## Current Innovation

Over the past several years the Valley School 6-12 math teachers and the district have been in an ongoing process of improving the math program. For the 2005-2006 and 2006-2007 school year the district was awarded a two year grant to hire an extra teacher to help improve our AYP, specifically with LEP students. The extra staffing has made a difference indicated by the school's test scores and improved learning environment for students. Time for teacher collaboration and continued professional development has been increased. After the grant expired, the district has continued to display a commitment to development of the math program by rehiring the teacher gained through the grant.

One of my goals is to increase the math and science department's supply of appropriate technology tools and to help all teachers use them in the most effective way possible. In 2008 we received a \$2000 grant from Idaho National Laboratory that allowed us to purchase 10 TI-84 Calculators with seven CBR motion detectors and temperature sensors. This is a good beginning for our efforts to bring real life experience and mathematics together through the use of technology. The TI-84 calculators have powerful graphing and statistical capabilities that can be very helpful in junior high through calculus, chemistry, and statistics when used appropriately.

We are rotating the calculators that we currently have through Algebra I in the eighth and ninth grades, Algebra II for sophomores and juniors, pre-calculus for juniors, and other classes as appropriate. The students have had positive activities that allowed them to experience live mathematics with the motion detectors. They have also been able to quickly see multiple representations of linear and quadratic equations and have made meaningful mathematical interpretations of data. The results can be observed through conversing with students, as well as seen on student assessments.

I am currently guiding other teachers as we implement the calculator use in the classroom. As with implementing computer programs in the classroom, calculators are best used by teachers who have a firm understanding of the learning tools that are being used by students. In addition to my experience using technology at all levels in the high school classroom, most of our texts also provide guidance for using these calculators to most effectively help students.

This year we have a new teacher for high school science. I have shown him the technology and he is interested in using it in the classroom. We agree that the pH sensors and temperature sensors are a need in the lab. More types of sensors can be purchased in the future as we obtain funds. The pH and temperature sensors will be a good start for this technology in our labs.

## Project Narrative

### Project Description:

As previously stated, the goal of this project is to increase the Valley School's supply of appropriate technology tools and to help all teachers use them in the most effective way possible. The specific goal for the Qwest grant involves implementing the use of a classroom set of TI-84 calculators, data collection interfaces, and probes. LabPro interfaces are a vital link in connecting the data sensors to the calculators for efficient collection during experiments and demonstrations. Powerful graphing and statistical capabilities the calculators have can be very helpful in the classroom with appropriate use, from junior high through advanced senior courses. The addition of this classroom set will give us the opportunity to use these powerful tools in more than one classroom at a time.

All levels in the program will use the calculators. Students will use the equipment for varied applications depending on their level. Science students can use the technology in all classes for a more meaningful laboratory experience. Algebra I students can do distance match activities with the motion detectors. Students get a first-hand experience interpreting what a distance-time graph represents and brings real life meaning to variables. Algebra students can also do a calculator group activity during which they match a given graph by manipulating slopes and intercepts on their calculators. This activity allows students to discuss the meanings of slope and intercepts and reinforces the concepts. At higher levels students can decide which functions will be appropriate to use for non-linear relationships. Calculus students are able to use the motion detectors to analyze velocity and acceleration and make connections of these real world concepts to derivatives and integrals. The statistics capabilities of the TI-84 Plus will prove to be valuable as a teaching tool from 6<sup>th</sup> grade through senior year. Data can be changed and re-graphed more quickly than graphing by hand and provides more time for discussion of concepts related to the various types of plots. These advantages will also hold true when teaching statistics. The ability to graph box and whisker plots and histograms can be valuable when observing patterns in data. The TI-84 statistical and regression features allow for more efficient analysis and discussion of concepts. We will teach linear equations, data analysis, functions, matrices, and other topics in a richer context with these tools.

### Project Team:

Team members include the 6-12 math and science staff of Valley School. I, Sam Franklin, will be the leader of this project. My role includes writing this proposal, and leading implementation of the technology in our classrooms through direct instruction of students and support of other staff members. Ryan Terry is our new 9-12 science teacher and is eager to learn and use these teaching tools. Erich Buschhorn is a high school teacher who will work to implement the technology within Algebra I, geometry, and Algebra II courses. Steve Hunter is using the TI-84 calculators that we currently have in eighth grade Algebra I as well as in pre-calculus. Janice Walter and Drew Crist teach 6<sup>th</sup> and 7<sup>th</sup> grade courses and are willing to use the technology when it is most beneficial to our students. This team is very willing to work to do what is best for students and relies on each other to grow as professionals. We will look forward to continued administrative approval and support which has been generous and second to none.

### Feasibility:

Valley has a staff that is willing to do whatever is needed to help students learn. We are willing and open to learn and apply new ideas. Implementation of the project should go smoothly. I have a background in chemistry and math as well as experience working with interfaces such as LabPro. I also have a willingness to share and work with staff members. We will be able to integrate the technology into the science and math programs effectively.

### Sustainability:

We have stability in our staffing, strong communication, and a desire to use all of our assets to their utmost potential. Regardless of any changes that may come our way, I think that the school will effectively use these tools for many years to come. We will also continue to work to expand from this point and gain more technology and activities for students.

**District Support:**

The district has been very supportive in the past and shares in our desire to offer the best possible educational opportunities to our students possible. Acquisition of the appropriate tools will be a smooth process, and the district will continue to back the project and the teaching practices of the team.

**Anticipated Outcomes:**

The project is already under way with the resources that are currently available. We are experiencing positive results as students are interested in the projects and are developing valuable insights. The enthusiasm that we are seeing is one of the outcomes. The expectations are that our students will continue to gain confidence as we implement better instruction and teaching tools. It is also anticipated that our test scores will continue to rise and that our students will enter college and the workforce more competent and prepared to face life's challenges.

## Scope and Sequence

January 2011: We will order technology as soon as funds become available.

February 2011: I will schedule time to update team on how to implement new technology. Students and teachers will begin use the technology within the classroom. The use of the requested technology will assist in achieving the following objectives based on the Idaho state standards.

Objectives: Students will be able to-

- Gain an understanding of premises behind graphing functions
- Represent linear equations using tables and graphs
- Graph by interpreting the slope and y-intercept of the line  $y = mx + b$
- Relate applications of functions to real-life uses
- Predict future measurements based on collected data
- Use technology to solve problems
- Use technology to collect data
- Use and interpret data and relationships in multiple representations (words, tables, equations, and graphs)
- Create and interpret basic frequency tables, box-and-whisker plots, and histograms
- Use statistical features of technology to evaluate data and make conclusions based on inferences and statistical tests
- Use and interpret regressions of data

Idaho State Standards

Goal 2.2: Apply the concepts of rates, ratios, and proportions.

Goal 2.4: Apply appropriate techniques and tools to determine measurements.

Goal 3.1: Use algebraic symbolism as a tool to represent mathematical relationships.

Goal 3.2: Evaluate algebraic expressions.

Goal 3.5: Understand the concept of functions.

Goal 3.6: Apply functions to a variety of problems.

Goal 4.4: Represent and graph linear relationships.

Goal 5.1: Represent data with a variety of formats.

Goal 5.2: Collect, organize, and display data.

Goal 5.3: Apply simple statistical measurements.

May 2011: Our primary assessment will be the ISAT. We will also develop student surveys to evaluate implementation strategies and use feedback to improve instruction. Our video will be created in May. We will meet as a team to evaluate what has been done and discuss improvements to be implemented during the 2011-2012 school year.

October 2011: Final video and report will be submitted.

## Budget Narrative

The proposed budget for our project includes the following items. Twenty TI-84 calculators will be purchased. Twenty LabPro interfaces, twenty pH sensors, and twenty temperature sensors will also be purchased. The interfaces work as a communications device between the calculators and sensors. We will also purchase a software program, LoggerPro 3, which will allow us to transfer data to computers as necessary. All equipment will be purchased from Vernier Software and Technology.

In January 2011 we will order technology as soon as funds become available. During February 2011 I will schedule time to update team on how to implement the new technology. Students and teachers will begin use the technology within the classroom. The use of the requested technology will assist in achieving the project objectives as outlined in our scope and sequence. I will meet with teachers individually to discuss any concerns and offer further instruction. In May 2011 we will develop student surveys to evaluate implementation strategies and use feedback to improve instruction. Our video will be created in May. We will meet as a team to evaluate what has been done and discuss improvements to be implemented during the 2011-2012 school year. The final video and report will be submitted in October of 2011.

Activity	Capital Objects	Quantity	Price per unit	Total
Data Collection and Analysis	TI-84 Calculators	20	\$108	\$2,160
Data Collection	LabPro Interfaces	20	\$220	\$4,400
Data Collection	pH Sensors	20	\$79	\$1,580
Data Collection	Temperature Sensors	20	\$29	\$580
Data Collection and Analysis	Logger Pro 3 Software	1	\$189	\$189
			Grand Total	\$8,909